

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

#### ABSTRACT OF THE DISCLOSURE

A system and method of detecting acousto-photonic emissions in optically turbid media that provide increased levels of detection sensitivity. The detection system includes an ultrasonic transducer, a laser, a photo-detector for detecting ultrasound-modulated laser light, and circuitry for processing the detected signals for subsequent analysis. The ultrasonic transducer generates an ultrasonic wave that propagates within an optically turbid medium. The laser generates a coherent light beam, which is split to form signal and reference beams. The signal beam is sent through the turbid medium, where it is phase modulated by the ultrasound. The ultrasound-modulated signal beam is provided to a photo-refractive crystal for subsequent interference with the reference beam to convert the phase modulation to intensity modulation. The DC offset of the signal beam intensity provides a measure of the magnitude of the mean phase shift induced by the ultrasound on the multiply scattered optical field within the turbid medium.

20